

IN THE CLAIMS:

Please revise the set of pending claims as set forth herein.

1. (Currently Amended) A method for communicating information on a frequency modulated carrier frequency via a communication channel connecting a transmitter on a transmitting side and a receiver on a receiving side, involving frequency modulation with a modulation index M that is not greater than 0.2 to thus compress a bandwidth of ~~an information~~ the frequency-modulated carrier signal to have a small or very small frequency deviation and two ~~significant~~ sidebands at the output of the modulator of the transmitter, the method comprising:

frequency modulating ~~an information signal~~ a carrier frequency with a modulation index M that is not greater than 0.2 to compress a bandwidth of the ~~information~~ frequency-modulated signal to form a narrow band or very narrow band frequency-modulated ~~information carrier~~ signal having a small or very small carrier frequency deviation at the transmitting side of a narrow or very narrow band communication channel and in said communication channel;

filtering the narrow band or very narrow band frequency-modulated carrier signal to ~~remove~~ suppressing upper and lower ~~significant~~ sidebands of the narrow band or very narrow band frequency-modulated ~~information carrier~~ signal;

transmitting, via the communication channel, said narrow band or very narrow band frequency-modulated ~~information carrier~~ signal without the upper and lower ~~significant~~ sidebands such that the transmitted ~~information~~ frequency-modulated carrier signal obtains a total power of said transmitter and includes only the instantaneous frequency varied about the carrier frequency;

receiving the narrow band or very narrow band frequency-modulated ~~information~~ carrier signal without any upper and lower ~~significant~~ sidebands from the communication channel at the receiving side of the communication channel; and

expanding the frequency deviation of the received narrow band or very narrow band frequency-modulated ~~information~~ carrier signal, without any upper and lower ~~significant~~ sidebands at the receiving side and outside of said communication channel so as to form an expanded-wideband-frequency deviation ~~information~~ signal, the step of expanding for improving a signal-to-noise ratio and performed such that a bandwidth of said narrow band or very narrow band communication channel is never expanded.

2. (Currently Amended) The method as set forth in claim 1, further comprising:
converting the expanded-wideband-frequency-deviation ~~information~~ signal to a low frequency signal or audio signal.

3. (Currently Amended) The method as set forth in claim 1, further comprising:
further processing the expanded-wideband-frequency-deviation ~~frequency modulated~~ ~~information~~ signal.

4. (Currently Amended) The method as set forth in claim 1, further comprising:

converting the narrowband or very narrowband frequency-modulated ~~information~~ carrier signal without upper and lower ~~significant~~ sidebands received from the communication channel to a narrowband intermediate frequency (IF) ~~information~~ signal without upper and lower ~~significant~~ sidebands before expanding its frequency deviation.

5. (Currently Amended) The method as set forth in claim 4, further comprising:
passing the narrowband IF ~~information~~ signal without upper and lower ~~significant~~ sidebands through a half wave rectifier and schmitt trigger; and
cleaning an information signal output by the schmitt trigger with a wave shaping circuit.

6. (Currently Amended) The method as set forth in claim 1, wherein the expanding step includes:
expanding the frequency deviation of the received narrowband or very narrowband frequency-modulated ~~information~~ carrier signal without upper and lower ~~significant~~ sidebands by frequency multiplication.

7. (Currently Amended) The method as set forth in claim 1, wherein the expanding step includes:

expanding the frequency deviation of the received narrowband or very narrowband frequency-modulated ~~information~~ carrier signal without the upper and lower ~~significant~~ sidebands by a frequency multiplier.

8. (Currently Amended) The method as set forth in claim 1, further comprising:
removing noise from the narrowband or very narrowband frequency-modulated ~~information~~ carrier signal without the upper and lower ~~significant~~ sidebands received from the communication channel before converting said narrowband or very narrowband frequency-modulated ~~information~~ carrier signal without the upper and lower ~~significant~~ sidebands to a low frequency signal or audio signal.

9. (Currently Amended) The method as set forth in claim 1, further comprising after the step of expanding, the step of demodulating the expanded-wideband-frequency-deviation ~~information~~ signal to output an audio signal having sound quality comparable to sound recorded on CD-ROM.

10. (Previously Presented) A receiver for receiving and processing narrow band or very narrow band frequency-modulated information signals without upper and lower sidebands that have a predetermined small or very small frequency deviation due to compression of transmitted signals,

and that have been transmitted over a narrow band or very narrow band communication channel, the receiver comprising:

means for receiving from the communication channel the narrow band or very narrow band frequency-modulated information signals without the upper and lower sidebands, said narrow band or very narrow band frequency-modulated information signals without the upper and lower sidebands having the predetermined small or very small frequency deviation; and

a circuit that expands the predetermined small or very small predetermined frequency deviation of the received narrow band or very narrow band frequency-modulated information signals without the upper and lower sidebands to form an expanded wideband frequency deviation information signal, said frequency deviation expanding circuit including a phase lock loop circuit having a frequency divider with a dividing ratio that corresponds to a selected expansion of the frequency deviation, an output signal of the phase lock loop circuit being down-converted to a second wideband intermediate frequency information signal.

11. (Canceled).

12. (Canceled).

13. (Original) The receiver according to claim 10, wherein the frequency deviation expanding circuit includes:

a circuit having frequency-multiplying characteristics; and
a filter, connected to an output of the circuit having frequency-multiplying characteristics, the filter passing a multiplied-frequency signal component.

14. (Previously Presented) The receiver according to claim 10, further comprising:
means for removing noise from information signals from the receiving means before said signals from said receiving means are converted to a low frequency signal or audio signal.

15. (Currently Amended) A transmitter for transmitting a frequency-modulated carrier ~~frequency~~ ~~an information~~ signal via a communication channel connecting a transmitting side and a receiving side, involving frequency modulation with a modulation index M that is not greater than 0.2 to thus compress a bandwidth of the ~~information~~ carrier signal to have a small or very small frequency deviation at the transmitting side of the communication channel and in the communication channel, the transmitter comprising:

means for frequency modulating a carrier ~~an information~~ signal with a modulation index M that is not greater than 0.2 to compress a bandwidth of the ~~information~~ carrier signal to form a narrow band or very narrow band frequency-modulated ~~information~~ carrier signal having a small or very small frequency deviation at the transmitting side of a narrow or very narrow band communication channel and in said communication channel;

means for filtering said narrow band or very narrow band frequency-modulated carrier signal output from said modulating means to remove ~~suppressing~~ upper and lower ~~significant~~ sidebands of the narrow band or very narrow band frequency-modulated ~~information~~ carrier signal prior to transmission; and

means for transmitting, via the communication channel, said narrow band or very narrow band frequency-modulated ~~information~~ carrier signal without the upper and lower ~~significant~~ sidebands such that the transmitted ~~information~~ carrier signal obtains a total power of said transmitter and includes only the instantaneous frequency varied about the carrier frequency.

16. (Currently Amended) The transmitter according to claim 15, wherein said means for ~~suppressing~~ filtering includes a bandpass filter.

17. (Currently Amended) A method for communicating information on a phase-modulated carrier frequency via a communication channel connecting a transmitter on a transmitting side and a receiver on a receiving side, involving phase modulation with a modulation index M that is not greater than 0.2 to thus compress a bandwidth of ~~an information~~ the phase-modulated carrier signal to have a small or very small frequency deviation and two ~~significant~~ sidebands at the output of the modulator of the transmitter, the method comprising:

phase modulating a carrier frequency ~~an information signal~~ with a modulation index M that is not greater than 0.2 to compress a bandwidth of the ~~information~~ phase-modulated carrier

signal to form a narrow band or very narrow band phase-modulated ~~information~~ carrier signal having a small or very small carrier frequency deviation at the transmitting side of a narrow or very narrow band communication channel and in said communication channel;

filtering the narrow band or very narrow band phase-modulated carrier signal to remove suppressing upper and lower ~~significant~~ sidebands of the narrow band or very narrow band phase-modulated ~~information~~ carrier signal;

transmitting, via the communication channel, said narrow band or very narrow band phase-modulated ~~information~~ carrier signal, the instantaneous frequency varied about the carrier frequency only, without the upper and lower ~~significant~~ sidebands such that the transmitted ~~information~~ phase-modulated carrier signal obtains a total power of said transmitter;

receiving the narrow band or very narrow band phase-modulated ~~information~~ carrier signal without any upper and lower ~~significant~~ sidebands from the communication channel at the receiving side of the communication channel; and

expanding the frequency deviation of the received narrow band or very narrow band phase-modulated ~~information~~ carrier signal, without any upper and lower ~~significant~~ sidebands at the receiving side and outside of said communication channel so as to form an expanded-wideband-frequency deviation ~~information~~ signal, the step of expanding for improving a signal-to-noise ratio and performed such that a bandwidth of said narrow band or very narrow band communication channel is never expanded.

18. (Currently Amended) The method as set forth in claim 17, further comprising:
converting the expanded-wideband-frequency-deviation ~~information~~ signal to a low
frequency signal or audio signal.

19. (Currently Amended) The method as set forth in claim 17, further comprising:
further processing the expanded-wideband-frequency-deviation ~~phase-modulated~~
~~information~~ signal.

20. (Currently Amended) The method as set forth in claim 17, further comprising:
converting the narrowband or very narrowband phase-modulated ~~information~~ carrier
signal without upper and lower ~~significant~~ sidebands received from the communication channel to
a narrowband intermediate frequency (IF) ~~information~~ signal without upper and lower ~~significant~~
sidebands before expanding its frequency deviation.

21. (Currently Amended) The method as set forth in claim 20, further comprising:
passing the narrowband IF ~~information~~ signal without upper and lower ~~significant~~
sidebands through a half wave rectifier and schmitt trigger; and
cleaning an information signal output by the schmitt trigger with a wave shaping
circuit.

22. (Currently Amended) The method as set forth in claim 17, wherein the expanding step includes:

expanding the frequency deviation of the received narrowband or very narrowband phase-modulated ~~information~~ carrier signal without upper and lower ~~significant~~ sidebands by frequency multiplication.

23. (Currently Amended) The method as set forth in claim 17, wherein the expanding step includes:

expanding the frequency deviation of the received narrowband or very narrowband phase-modulated ~~information~~ carrier signal without the upper and lower ~~significant~~ sidebands by a phase-lock loop (PLL) frequency multiplier.

24. (Currently Amended) The method as set forth in claim 17, further comprising:
removing noise from the narrowband or very narrowband phase-modulated ~~information~~ carrier signal without the upper and lower ~~significant~~ sidebands received from the communication channel before converting said narrowband or very narrowband phase-modulated ~~information~~ carrier signal without the upper and lower ~~significant~~ sidebands to a low frequency signal or audio signal.

25. (Currently Amended) The method as set forth in claim 17, further comprising after the step of expanding, the step of demodulating the expanded-wideband-frequency-deviation ~~information~~ signal to output an audio signal having sound quality comparable to sound recorded on CD-ROM.

26. (Previously Presented) A receiver for receiving and processing narrow band or very narrow band phase-modulated information signals without upper and lower sidebands that have a predetermined small or very small frequency deviation due to compression of transmitted signals, and that have been transmitted over a narrow band or very narrow band communication channel, the receiver comprising:

means for receiving from the communication channel the narrow band or very narrow band phase-modulated information signals without the upper and lower sidebands, said narrow band or very narrow band phase-modulated information signals without the upper and lower sidebands having the predetermined small or very small frequency deviation; and

a circuit that expands the predetermined small or very small predetermined frequency deviation of the received narrow band or very narrow band phase-modulated information signals without the upper and lower sidebands to form an expanded wideband frequency deviation information signal, said frequency deviation expanding circuit including a phase lock loop circuit having a frequency divider with a dividing ratio that corresponds to a selected expansion of the frequency deviation, an output signal of the phase lock loop circuit being

down-converted to a second wideband or very wideband intermediate frequency information signal.

27. (Canceled).

28. (Canceled).

29. (Original) The receiver according to claim 26, wherein the frequency deviation expanding circuit includes:

a circuit having frequency-multiplying characteristics; and

a filter, connected to an output of the circuit having frequency-multiplying characteristics, the filter passing a multiplied-frequency signal component.

30. (Previously Presented) The receiver according to claim 26, further comprising:
means for removing noise from information signals from the receiving means before said signals from said receiving means are converted to a low frequency signal or audio signal.

31. (Currently Amended) A transmitter for transmitting a phase-modulated carrier frequency ~~an information~~ signal via a communication channel connecting a transmitting side and a receiving side, involving phase modulation with a modulation index M that is not greater than

0.2 to thus compress a bandwidth of the ~~information~~ carrier signal to have a small or very small frequency deviation at the transmitting side of the communication channel and in the communication channel, the transmitter comprising:

means for phase modulating ~~an information~~ a carrier signal with a modulation index M that is not greater than 0.2 to compress a bandwidth of the ~~information~~ carrier signal to form a narrow band or very narrow band ~~frequency-modulated information~~ phase-modulated carrier signal having a small or very small frequency deviation at the transmitting side of a narrow or very narrow band communication channel and in said communication channel;

means for filtering said narrow band or very narrow band phase-modulated carrier signal output from said modulating means to remove ~~suppressing~~ upper and lower significant sidebands of the narrow band or very narrow band phase-modulated ~~information~~ carrier signal prior to transmission; and

means for transmitting, via the communication channel, said narrow band or very narrow band phase-modulated ~~information~~ carrier signal without the upper and lower significant sidebands such that the transmitted ~~information~~ carrier signal obtains a total power of said transmitter and includes only the instantaneous frequency varied about the carrier frequency.

32. (Currently Amended) The transmitter according to claim 31, wherein said means for ~~suppressing~~ filtering includes a bandpass filter.

33. (Previously Presented) The method according to claim 1, wherein said method steps are applied within a wired digital and/or analog telecommunication system.

34. (Previously Presented) The method according to claim 1, wherein said method steps are applied within a wireless digital and/or analog telecommunication system.

35. (Previously Presented) The method according to claim 17, wherein said method steps are applied within a wired digital and/or analog telecommunication system.

36. (Previously Presented) The method according to claim 17, wherein said method steps are applied within a wireless digital and/or analog telecommunication system.